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WAR FOOD ADMINISTRATION

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Request for Program Determination
for Dehydration

1944

Prepared by Dairy and Poultry Branch
and Processing Facilities Branch
War Food Administration
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INDEX

I. OBJECT

II. GOAL

III. GENERAL JUSTIFICATION

IV. OVER-ALL MILK SITUATION

Supply

Demand

Greater Requirements for War Uses

V. INCREASING THE EFFICIENCY OF MILK UTILIZATION TO
MEET WAR NEEDS

Diversion of skim milk from animal to human food

VI. DRIED SKIM MILK SUPPLY AND DEMAND SITUATION

Supply

Recent Trends in Dried Skim Milk Production

Difference between Present Capacity and Production

Dried Whole Milk

Demand

VII. LABOR REQUIREMENTS

VIII. ADVANTAGES OF DEHYDRATED MILK

IX. POST-WAR USES

X. PRIORITY POLICY FOLLOWED IN 1943 IN EXPANDING MILK
DRYING FACILITIES

ATTACHMENTS

Controlled Material Requirements and
Regular B Product Requirements

Charts and Tables



WAR FOOD ADMINISTRATION
Processing Facilities Branch

A Request for Program Determination for Dehydrated Skim Milk

I. OBJECT

The War Food Administration desires that only the dry milk part of Program Determination No. 189 (covering dehydrated milk, vegetables, fruit, meat, etc.), which expired December 31, 1943, be extended for another 12 months to December 31, 1944.

The War Production Board has already allotted to the War Food Administration sufficient materials to manufacture the equipment, and authorized a production schedule dated September 6, 1943 under order L-292. Estimates (see Table 5 attached) of the construction materials and regular B Products required have been submitted for the four quarters of 1944 to the industry divisions of WPB, and no difficulties in obtaining these materials and products are anticipated. First quarter requirements have been provided as requested.

II. GOAL

The goal of the War Food Administration is to provide 170 million pounds of additional skim milk dehydration capacity which, when added to existing facilities, will provide 686 million pounds of dried skim milk for military, Lend-Lease and civilian requirements. A large percentage of civilian requirements will not be met even if this goal is reached. To provide 170 million pounds will require 32 spray process milk drying units and 140 roller drying units.

III. GENERAL JUSTIFICATION

Declining total milk supplies and the over-all milk situation necessitate diversion of skim milk from animal to human food. The present demand for dried skim milk is greater than supply. Raw materials (skim milk) are available if plants are properly located. Labor requirements for construction and operation of these facilities are available since plants will be located in rural areas. Many advantages result from dehydrating skim milk such as saving in warehouse space, saving in refrigeration, etc. These general points are amplified in the following presentation, together with other data.

IV. OVER-ALL MILK SITUATION

A clear consideration of the essentiality of additional dehydrating facilities for skim milk requires a brief resume of the over-all milk situation.

SUPPLY

This past year the armed forces, Lend-Lease applicants, and American civilians would have consumed some 140 billion pounds of milk in all its forms if it had been available.^{1/} Only about 118 billion pounds were produced. This means that 1943 demands for milk and its products were over 1/6 greater than were supplied. As indicated in Chart I and Table 1, total milk production reached a high point of 119 billion pounds in 1942. That year dairy feed conditions were unusually favorable. During 1943 production decreased about 1 billion pounds, and in 1944 it is expected to be slightly below the 1943 level. Therefore, in 1944 over-all milk supplies will be even farther below requirements than they were in 1943.

DEMAND

Chart II reflects the increasing demand for war purposes, and, while the total milk supply declined in 1943 from the 1942 peak and 1944 shows a further estimated decline, total milk production is considerably in excess of 1935, but the amount available for civilians will be less than in 1935. It is significant to note that in the face of a declining amount of milk and all its products available for civilians in 1943, fluid milk and cream consumption is the highest on record. The main loss in production in dairy products to compensate for this increase occurred in butter.

Chart II and Table 2 do not reflect any figures for skim milk consumption since the whole milk has been accounted for in the form of butter and cream. In other words, regardless of what is done with the skim milk, it takes the same amount of whole milk to make butter and cream. Any saving of skim milk through better utilization has the effect of increasing the total food available to civilians from milk. Since there has been an increasing consumption in recent years of dried skim milk as human food, the nutritive value of milk has been increased by this amount, taking into account the difference between the efficiency of milk as a direct human food versus animal food.

Greater Requirements for War Uses. Prior to 1940 substantially all milk produced in the United States was consumed by civilians within the borders of the country. Since that time a larger and larger proportion has been used for defense or war purposes--including military and Lend-Lease requirements. In 1940 about 1% of our total milk production was used by the military and Lend-Lease. By 1943 total war requirements had grown to where 14% was used for these purposes. In 1944 this will increase to 17%, or over 1/6 of the country's milk production.

^{1/} Estimated amount on a milk equivalent basis which would have been taken at existing 1943 prices of the various dairy products, BAE, U.S.D.A.

V. INCREASING THE EFFICIENCY OF MILK UTILIZATION TO MEET WAR NEEDS

During the past two years or so, when foods have been growing scarce due to unprecedented demands, the War Food Administration has been working to increase the efficient use of milk by diverting as large an amount of milk solids as possible directly to human food. In 1935 only 187,531,000 pounds of skim milk were converted into a form suitable for human consumption (dried skim milk). This amount has been steadily increased to a record high of 565 million pounds in 1942. The importance of butter as a food has been recognized for many years, but the food value of skim milk which contains the other milk solids has not been given, until recently, the consideration it deserves. In the past much of the skim milk has been left on farms and fed to livestock. A portion of it has been wasted. When milk is fed to livestock and the meat from this livestock is used as human food, only 10% to 25% of the food value is recovered; the remaining 75% to 90% is lost in the digestive, assimilation and utilization processes of the animals.

DIVERSION OF SKIM MILK FROM ANIMAL TO HUMAN FOOD

The war demands for foods, especially animal proteins such as found in skim milk, have been increasing and will continue to increase for the duration and a considerable time thereafter. It is these food demands that have forced upon us the need to preserve milk solids. For that reason every attempt needs to be made to conserve as large a portion of the milk solids as possible. Whole milk is made up of two main components--the butter fat and the milk solids not fat.

One of the best methods of diverting skim milk solids from animal feed to human food is by drying the skim milk which ordinarily is fed to animals in the liquid form. A tremendous reservoir of this skim milk is still left on farms, a considerable amount of which can be tapped. Some 30 billion pounds--or more than 1/4 of the total amount produced--is still being used on farms, fed to animals; and some may be entirely wasted. Of this 30 billion pounds, about 25 billion is within 12 States. If the necessary equipment were made available in the proper places, much of this could be diverted to human use in the form of dried skim milk. (See Chart IV and Table 4.)

It is fundamental that the program of drying skim milk requires no additional milk production and the minimum of additional manpower. Actually it is a salvage program--salvaging milk now being left on farms. A large percentage of the skim milk fed on farms is fed to hogs. The 1944 production goals of WFA on hogs has been reduced 15% from the 1943 goal which will have the effect of making more milk available for drying.

VI. DRIED SKIM MILK SUPPLY AND DEMAND SITUATION

The 1944 requirements compared with the expected production of dried skim milk are as follows (see also Chart III and Table 3):

Civilian, for all uses	:	:	323.1	:
Lend-Lease (except liberated areas)	:	:	:	:
Military	:	151.4	:	:
Export	:	57.9	:	:
Liberated areas	:	9.4	:	:
Total military, Lend-Lease and export	:	144.2	:	:
Grand total	:	:	362.9	:
Expected production with existing facilities*	:	:	:	686
Deficit which would exist if the request herewith were not granted	:	170	:	:
Estimated dried milk produced by plants recommended in this request	:	170	:	:

* Report of Requirements and Allocations Control, FDA, Dec. 2, 1943

COMMENTS ON SUPPLY SITUATION

Recent Trends in Dried Skim Milk Production. For several years prior to 1943 the production of dried skim milk has been increasing. This increase was especially rapid during the three years 1940 to 1942, inclusive. In 1942 production was stepped up to a record high of 565 million pounds. Unfortunately the 1943 production did not quite reach the 1942 amount. The latest estimate places the 1943 production at 480 million pounds. Of this 480 million pounds, 308 million, or two-thirds of it, was used by the military forces and Lend-Lease, leaving only 172 million pounds available for civilian use, the lowest since 1932. (See Chart III and Table 3.)

Difference between Present Capacity and Production. The question can be fairly asked, "Why was production of skim milk in 1943 less than in 1942 when it is taken into account that 105 million pounds of additional dehydration capacity was approved during 1943?" A large number of plants did not get into operation until after the milk flush which occurs in April, May, June and July. Likewise, due to diversion of fluid milk for other uses, the average production of existing plants was somewhat reduced. The reduction in production in these plants was not of sufficient magnitude to justify removing them to another locality. Practically all roller drying facilities are a part of a larger enterprise which may include the manufacture of butter, cheese, and the sale

of fluid milk. Accordingly, all that would be involved would be moving a drier which should not be moved since it would be needed to take care of excess milk in the flush season.

Another important factor is that the 1943 production of dried whole milk was double that of the year before. A large part of this increase in dried whole milk was at the expense of dried skim milk, due to diversion of facilities from skim to whole milk. Latest estimates indicate that 125 million pounds of dried whole milk were produced in 1943 compared with 63 million pounds for 1942.^{2/} Thus the over-all production of dried milk, skim and whole, in 1943 will have been nearly as large as in 1942, the high record year. The total of the two for the year just ending was 605 million pounds compared with 626 million pounds produced in 1942, or a reduction of about 4%.

Dried Whole Milk. 86% of the allocated dried whole milk supply is for the military services and Lend-Lease. This milk is reconstituted to fluid milk by the addition of water and takes the place of fresh milk for our overseas forces.

COMMENTS ON DEMAND SITUATION

362.9 million pounds of dried skim milk is required for the military, Lend-Lease and other exports. The civilian demand of 323 million pounds which we propose to supply represents approximately what was made available to civilians in 1941. Two thirds of the total civilian requirements are made up of demands for adding proteins to bread and other bakery products. The actual demand of civilians has not been indicated since it so far exceeds the possibility of attainment that useless effort would be expended in explaining the demand which could not possibly be met. For a complete breakdown of civilian requirements see Table 6.

VII. LABOR REQUIREMENTS

Labor problems in manufacturing the necessary equipment have already been resolved and a production schedule approved by the War Production Board as an amendment to L-292 dated September 6, 1943.

Construction labor has not presented any problem in the past, and, due to the rural nature of the areas in which these plants are located, none is anticipated in the future. The cost of the building alone will not, in hardly any case, exceed \$50,000. In many instances only additions to existing buildings will be required.

Labor to operate the plants does not involve any particular labor questions. A typical spray type plant will require 12 men for a 24-hour day, and a typical roller type plant will require 7 men for one machine for 24 hours.

VIII. ADVANTAGES OF DEHYDRATED MILK

Fluid milk lends itself unusually well to dehydration; the cost of dehydration is low and the food value of the end product is high. Per unit of food value, dried milk has unusually low weight and volume; a pound of dried skim milk has the same food value as about 10 pounds of liquid skim milk. Thus one motor truck or railroad car can carry 10 times as much food in the form of dried skim milk as in the form of liquid skim milk. Special tank trucks and railroad cars are needed to ship fluid milk, and their general use is considered impractical in view of the possibility of handling the product in dry form. By concentration of the product before shipment in fluid form the ratio can be reduced to approximately 4 to 1. Moreover, dried skim milk is not perishable, needs no refrigeration either in the warehouse or while being transported, and can be shipped in unbreakable containers. These are especially important features when considering military uses where foods must be shipped long distances and often under extremely unfavorable shipping and handling conditions.

Except for the butterfat, dried skim milk contains the same nutrients as does fresh fluid milk. The dried skim milk contains animal proteins, important vitamins such as riboflavin and thiamin, as well as necessary minerals for human nutrition. Various milk handling processes result in considerable loss of Vitamin C (ascorbic acid). However, this loss occurs in any type of milk handling, and is not confined to dehydrated skim milk.

IX. POST-WAR USES

Present prospects are that dried skim milk dehydrating facilities erected during the war as an emergency measure to feed our armed services and Allies will not create a post-war problem such as is in prospect for many other facilities. There are a number of reasons for this among which are:

1. Large, unsatisfied demands for skim milk to enrich bread.
2. Greater monetary return to milk producers in the manufacturing milk areas.
3. Skim milk can be more efficiently fed to animals in dried form than fluid.

Undoubtedly there will be some plants that will not be able to stand up under post-war conditions. However, we do not anticipate any general difficulty in the industry due to the present contemplated expansion.

X. PRIORITY POLICY FOLLOWED IN 1943 IN EXPANDING MILK DRYING FACILITIES

An attempt has been made to grant facilities for drying only to plants in areas away from city milk markets where there is a sufficient amount of skim milk available which is now being used for animal feed. Before priority is recommended by the War Food

Administration, a study is made of (1) the amount of skim milk available for processing within reasonable transportation distance; (2) the number of hogs on farms in relation to the skim milk produced; (3) other milk processing facilities available in the area; and (4) other pertinent facts. This preliminary data is then checked by field survey to determine the amount of milk which the proposed plant can reasonably expect to receive.

The resulting pattern of plant locations is reflected in Charts V and VI.

Prepared by Dairy and Poultry Branch and
Processing Facilities Branch
War Food Administration
January 21, 1944



WAR FOOD ADMINISTRATION

Processing Facilities Branch

TABLE 5
MATERIAL AND B PRODUCT REQUIREMENTS FOR CONSTRUCTION

CONTROLLED MATERIALS				1944			
	1st Quarter Tons	2nd Quarter Tons	3rd Quarter Tons	4th Quarter Tons		TOTAL Tons	
Carbon Steel	1,115	1,115	1,115	1,115	1,115	4,460	
Copper & Copper Base Alloys	32.4	32.4	32.4	32.4	32.4	129.6	

B PRODUCTS	
Amount and cost of equipment required:	

64	boilers - 250 HP	.....	\$ 64,000.00
120	boilers - 150 HP	.....	540,000.00
64	stokers	60 sq. ft.	
120	stokers	40 sq. ft.	
32	refrigeration compressors	.....	96,000.00
320	refrigeration compressors	.....	320,000.00
184	boiler feed pumps	.....	36,800.00

WAR FOOD ADMINISTRATION
Processing Facilities Branch

TABLE 6

Requirements

To maintain the nutritive levels and to supply dried skim milk for essential food uses, the requirements for 1944 have been established at 284.1 million pounds of roller and 39 million pounds of spray dried skim milk, which approximates the pre-war level of consumption, but falls far short of the anticipated demand. The total of 323.1 million pounds amounts to 2.5 pounds per capita. It constitutes about 46.7 per cent of anticipated production in 1944.

Although the baking industry alone could use 600 million pounds of dried skim milk to increase the nutritional value of bread and other bakery products, the suggested distribution of the requirement of 323.1 million pounds is as follows:

	Million Pounds
Baking industry	201.1
Prepared flours	15
Chocolate and confections	8
Institutional cooking soups, etc.	9
Sausage	20
Ice Cream	30
Milk drinks	20
Home use	10
Miscellaneous	<u>10</u>
Total	323.1

Dried Whole Milk

Consumption and Demand: Dried whole milk also is used largely by food industries. Consumption increased from 9 million pounds in 1932 to 23 million pounds in 1941. It is estimated that civilian consumption will be 19 million pounds in 1943 and that there will be a demand for 20 million pounds in 1944. This is only 14% of the total dried whole milk supply.